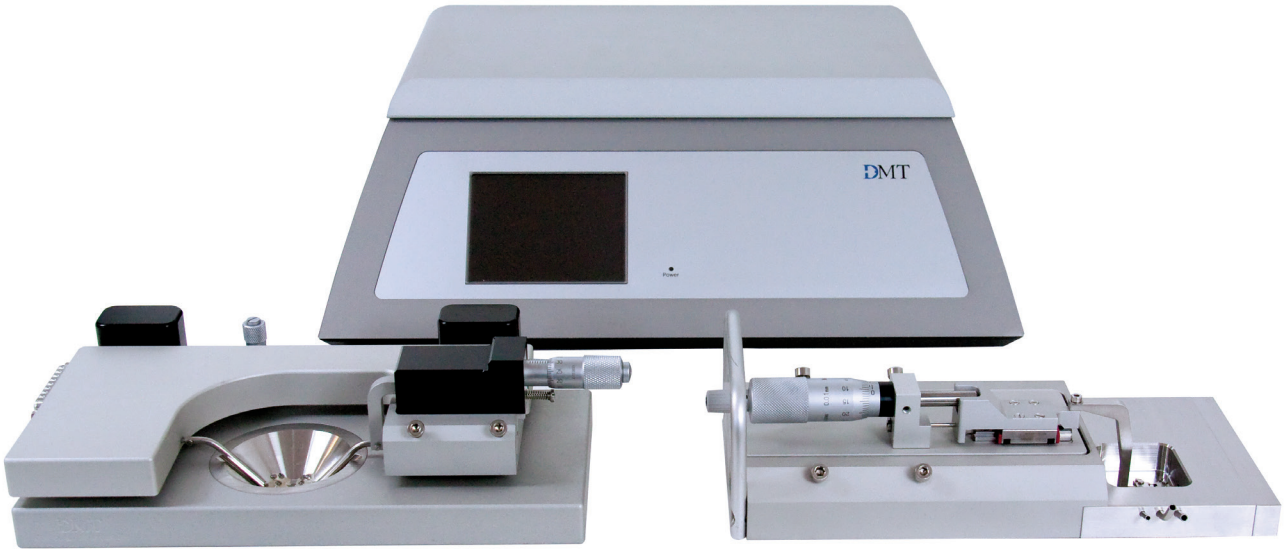
DMT
DANISH MYO TECHNOLOGY

WIRE MYOGRAPH SYSTEMS
360CW AND 320A
USER MANUAL



User Manual
Version 1.0

TRADEMARKS

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DMT reserves the right to alter specifications as required.
This document was, as far as possible, accurate at the time of printing. Changes may have been made to the software and hardware it describes since then. New information may be supplied separately.

This documentation is provided with the Wire Myograph system.

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DANISH MYO TECHNOLOGY

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SAFETY

The Wire Myograph System has been designed for use only in teaching and research applications. It is not intended for clinical or critical life-care use and should never be used for these purposes. Nor for the prevention, diagnosis, curing, treatment, or alleviation of disease, injury, or handicap.

- Do not open the apparatus: the internal electronics pose a risk of electric shock.
- Do not use this apparatus near water.
- To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture. Objects filled with liquids should not be placed on the apparatus.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.
- Only use attachments and accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.

The Wire Interface is delivered with an external 100-240VAC to 24VDC adapter. Protect the power adapter and cord from being walked on or pinched. Particularly at power plugs and the point where they connect to the apparatus. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way; such as, the power-supply cord or plug is damaged, liquid has spilled onto or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

EC DECLARATION OF CONFORMITY

Danish Myo Technology A/S
Certify and declare that the following apparatus:

Wire Myograph System - DMT360CW, DMT320A
Restrictive use: Only for laboratory use.

Manufactured by:
Danish Myo Technology A/S
Skejbyparken 152
8200 Aarhus N.
Denmark

Conforms with the essential requirements of the EMC Directive 2004/108/EC.
Based on the following specifications applied by:
EN 61326-1:2006
EN 61326-2-6:2006
EN 61326-2-6/Corr.:2007

And with the LVD Directive 2006/95/EC.
Based on the following specifications applied by:
EN 61010-1:2010
EN 61010-2-030:2010

General warnings regarding EMC:
Do not use this device in close proximity to sources of strong electromagnetic radiation (e.g. unshielded intentional RF sources), as these may interfere with the proper operation.

UNPACKING THE WIRE MYOGRAPH SYSTEM

Please take a few minutes to carefully inspect your new Wire Myograph System for damage which may have occurred during handling and shipping. If you suspect any kind of damage, please contact DMT immediately and the matter will be pursued as quickly as possible. If the packing material appears damaged, please retain it until a possible claim has been settled.

We recommend that you store the packing material for any possible future transport of the Wire Myograph System. Please contact DMT Sales Department for packing instructions if the original packing material is unavailable.

After unpacking your new Wire Myograph System, please use the following list to check that the system is complete:

Wire Interface
- Power supply (the shape of the AC plug varies by country; be sure that the plug has the right shape for your location)

Confocal Wire Myograph - 360CW or Wire Myograph - 320A
- Myograph connection cable with a temperature probe
- Plastic mounting jaws (360CW) or stainless steel mounting jaws with supports (320A)
- Chamber cover

Accessories:
- 1 x calibration kit (including bridge, T-balance and 2 gram weight)
- 1 x funnel
- 1 x stainless steel wire 40 µm
- 2 x Allen keys (360CW) or 3 x Allen keys (320A)
- 1 x high vacuum grease
- 1 x grease for protection of linear slides
- 4 x spare screws (360CW) for mounting of jaws or 5 x spare screws (320A)
- 1 x screwdriver
- 10 x spare cover glass od 12,0 x 0,17 mm

Optional Accessories:
- PowerLab
- LabChart
- DMT Device Enabler
- Stimulator
- pH meter
- Vacuum Pump
- Electronic vacuum valve
- Waste bottle
- Gas supply manifold

CHAPTER 1 - SYSTEM OVERVIEW

1.1 Wire Interface - front and rear

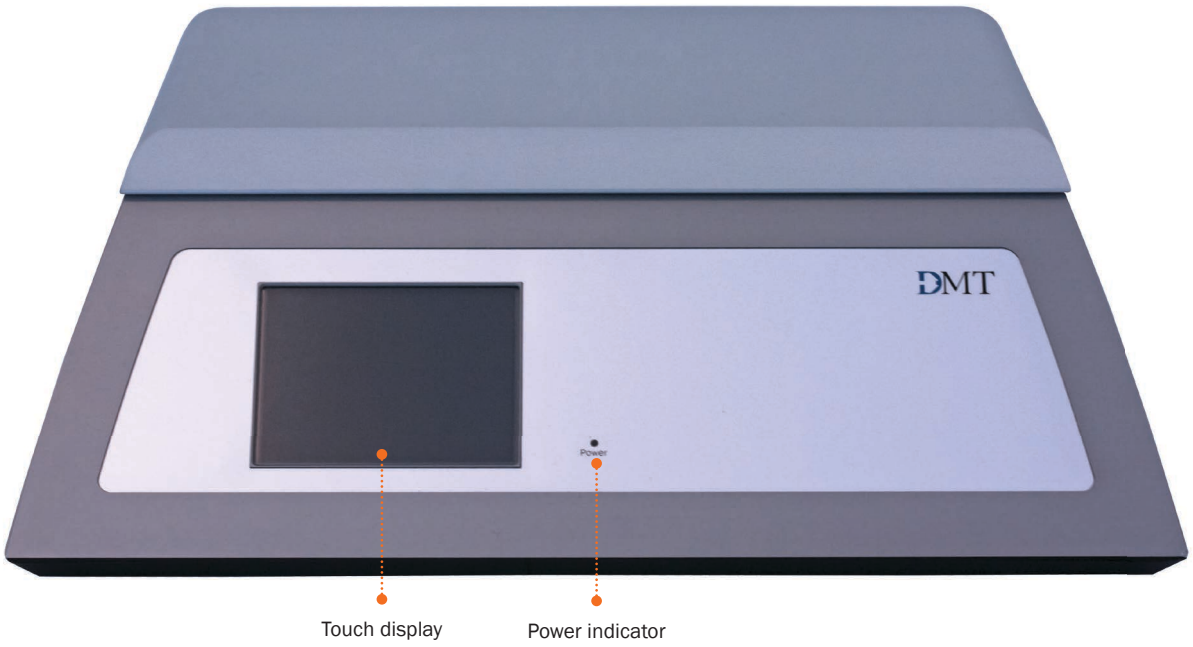


Figure 1.1 *Wire Interface - front*

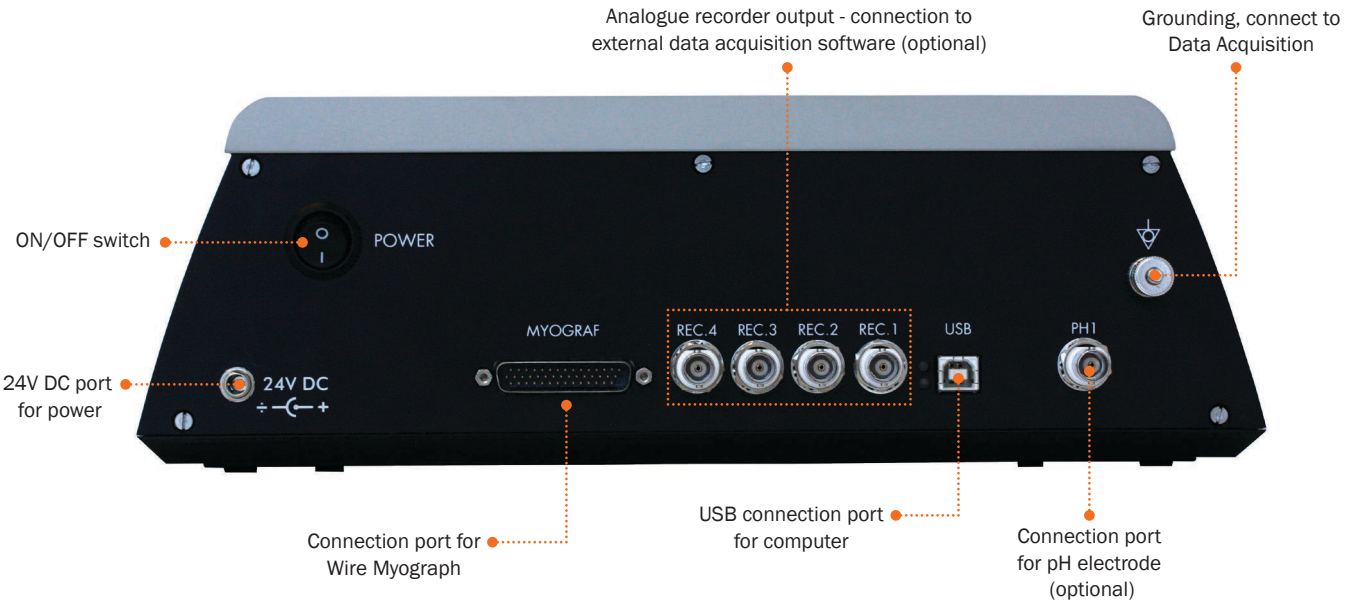


Figure 1.2 *Wire Interface - rear*

1.2 Wire Myographs

1.2.1 Confocal Wire Myograph - 360CW

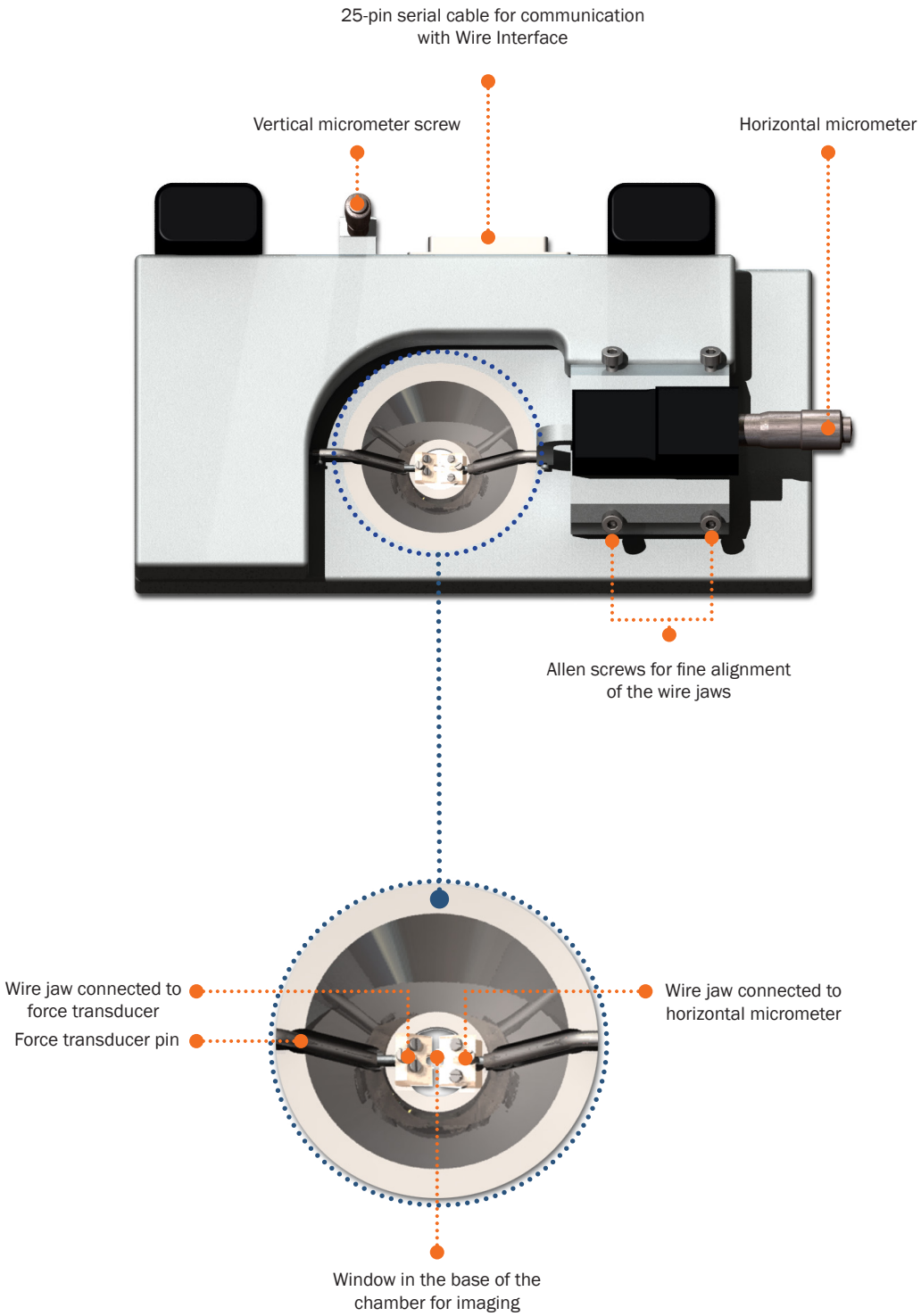

25-pin serial cable for communication with Wire Interface
Vertical micrometer screw
Horizontal micrometer
Allen screws for fine alignment of the wire jaws
Wire jaw connected to force transducer
Force transducer pin
Wire jaw connected to horizontal micrometer
Window in the base of the chamber for imaging

Figure 1.3 *Confocal Wire Myograph - 360CW with close-up of the chamber*

1.2.2 Single Wire Myograph - 320A

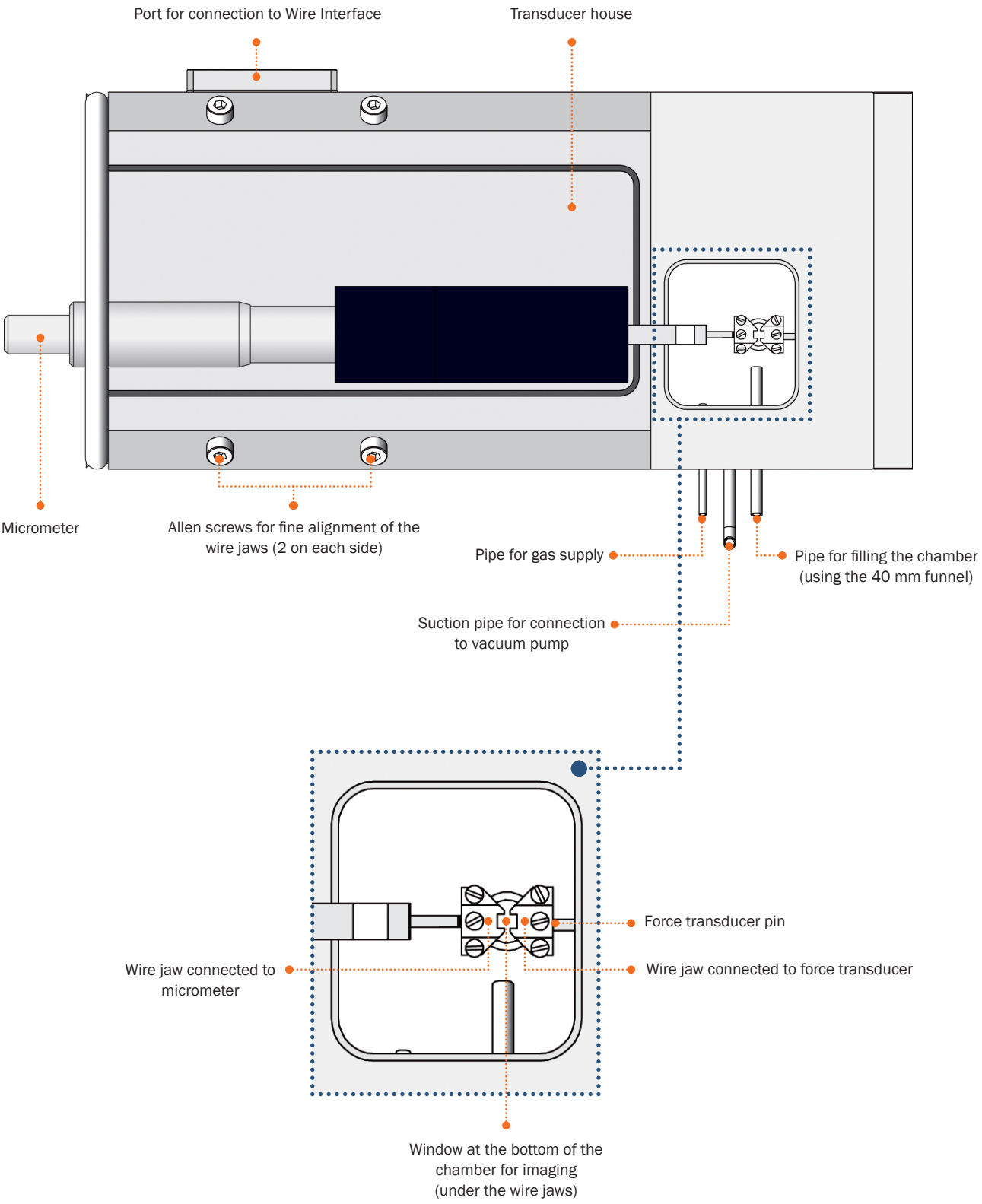

Port for connection to Wire Interface
Transducer house
Micrometer
Allen screws for fine alignment of the wire jaws (2 on each side)
Pipe for gas supply
Pipe for filling the chamber (using the 40 mm funnel)
Suction pipe for connection to vacuum pump
Force transducer pin
Wire jaw connected to micrometer
Wire jaw connected to force transducer
Window at the bottom of the chamber for imaging (under the wire jaws)

Figure 1.1 *Single Wire Myograph with close-up of chamber*

CHAPTER 2 - SETTING UP

2.1 Setting up the complete Wire Myograph System

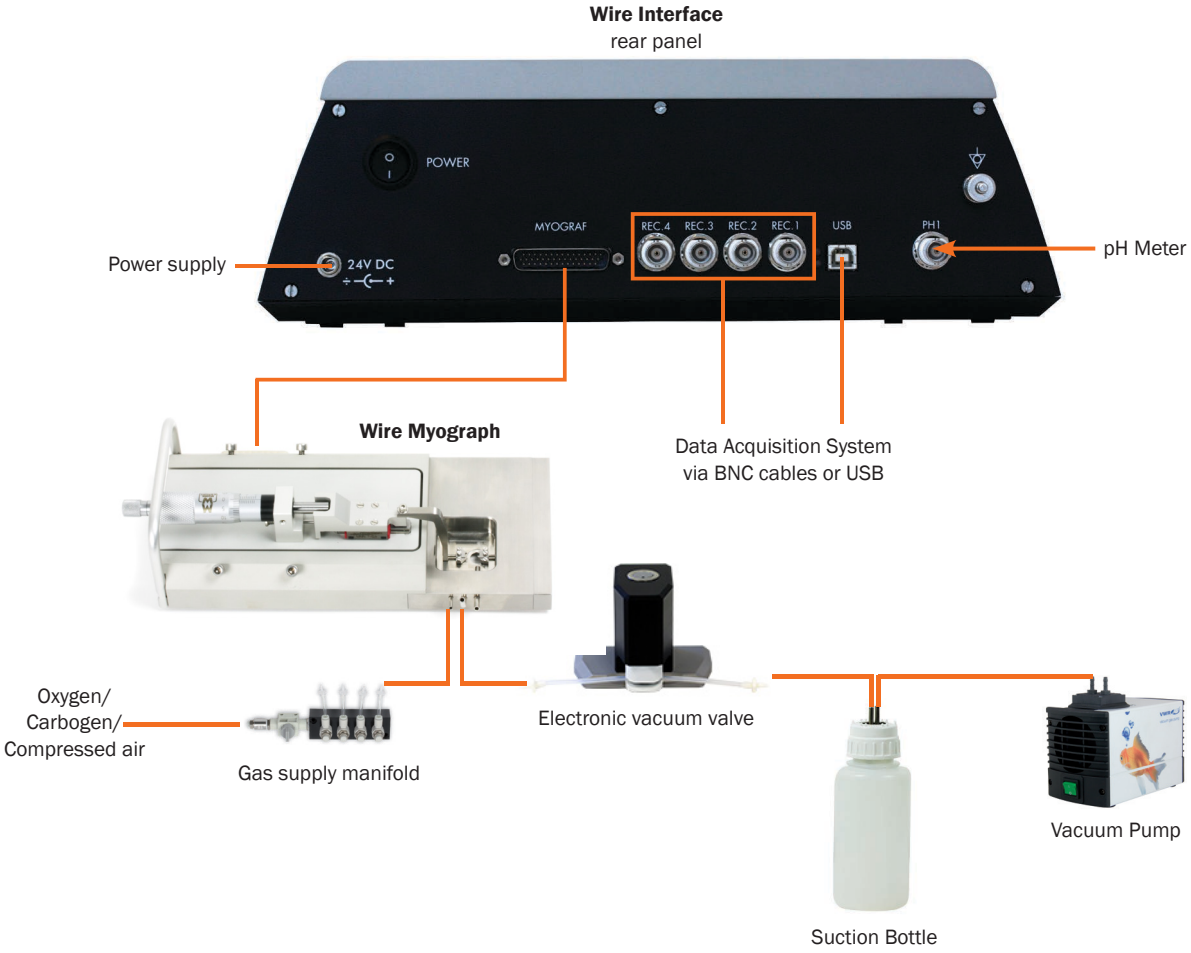


Figure 2.1 *Example of a complete Wire Myograph System - 320A*

Figure 2.1 is an example of a complete set-up for the Wire Myograph System - 320A. A set-up for Confocal Wire Myograph would look the same but with a Confocal Wire Myograph instead. The set-up includes optional equipment such as pH electrode for measuring pH in the buffer, an electronic vacuum valve, suction bottle, vacuum pump, a computer and Data Acquisition System.

IMPORTANT
TO RECORD A NOISE-FREE SIGNAL IT IS IMPORTANT TO CONNECT THE WIRE INTERFACE GROUND CONNECTION TO THE DATA ACQUISITION SYSTEM'S GROUND CONNECTION.

1. **Wire Myograph to Wire Interface connection:**
   Connect the Wire Myograph to the Wire Interface using the grey 44/25-pin connector cable. The end of the cable with the temperature probe is attached to the Wire Myograph.

2. **Wire Interface to computer connection:**
   Data acquisition is possible either by connecting the Wire Interface directly to a computer, or through a Data Acquisition System able to collect voltage output (0-2.5volts) such as a PowerLab Data Acquisition System or similar system.

   - **Direct computer USB connection for Labchart (AD Instruments) users (latest version of Labchart):**
     Connect the Wire Interface to the computer with the USB cable from the back panel to the USB port.

   - **Analog Data Output through a PowerLab or similar Data Acquistion System (optional):**
     Connect the Wire Interface to the analog data acquisition system using BNC cables. Connect Rec 1 (Chamber 1) on the Wire Interface to Input 1 on the analog data acquisition system. Rec 2 (Chamber 2) to Input 2 on the analog data acquisition system 2, and so forth. Connect the analog data acquisition system to one of the USB-ports on the computer.

3. **Turn on the Power:**
   Turn on the power to the Wire Interface at the power switch and then turn on the computer. Start the data acquisition program on the computer and the Wire Myograph System is now ready for use.
4. **Gas supply:**
   Connect the pipes for gas supply on the Confocal Wire Myograph 360CW chamber cover (see figure 2.3) to an adjustable gas supply using thin silicone tubing. For the Wire Myograph 320A connect the pipe for gas supply on the Wire Myograph side, see figure 2.4.

5. **Suction connection:**
   Connect the suction pipe on the Confocal Wire Myograph 360CW chamber cover (see figure 2.3) to a vacuum pump via a suction bottle and the electronic vacuum valve (optional). For the Wire Myograph 320A connect the suction pipe on the Wire Myograph side, see figure 2.4.

6. **pH electrode (optional):**
   Connect the pH electrode to the pH port on the rear of the Wire Interface.

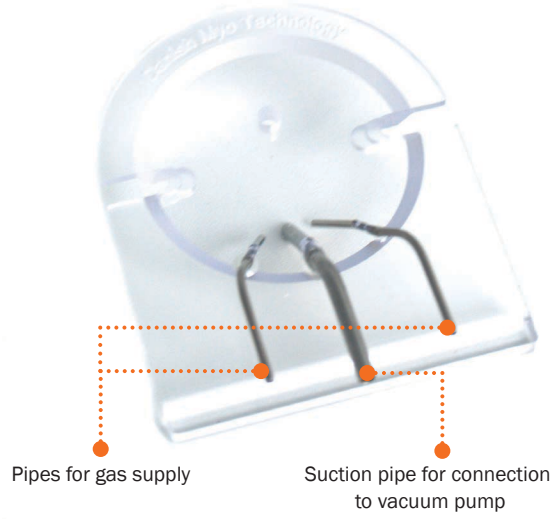


Figure 2.3 *Chamber cover for for Confocal Wire Myograph 360CW*

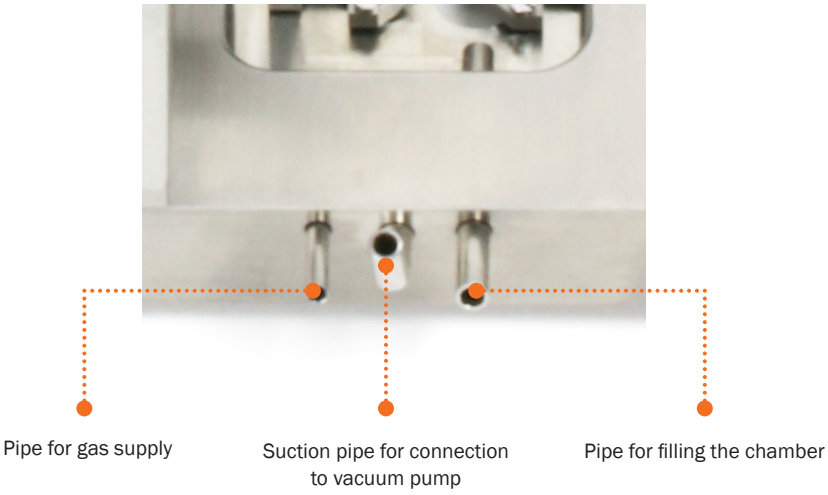


Figure 2.4 *Pipes on the side of Wire Myograph 320A*

2.2 The first force calibration

Prior to shipping, the Wire Myograph System has gone through two days of continuous testing including final force calibrations. However, DMT recommends that a new force calibration is performed before using the Wire Myograph System. The force calibration procedure is described in detail in chapter 3.7.1.

CHAPTER 3 - THE WIRE INTERFACE MENUS

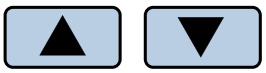
This chapter contains a detailed description of how to navigate the touch screen menus and how to use the special features of the Wire Interface.

3.1 General description on how to navigate the touch screen

Menus on the Wire Interface are all accessible by a touch screen. To access a menu, simply touch the screen. When a setting needs to be changed, press SELECT beside the line to be changed.

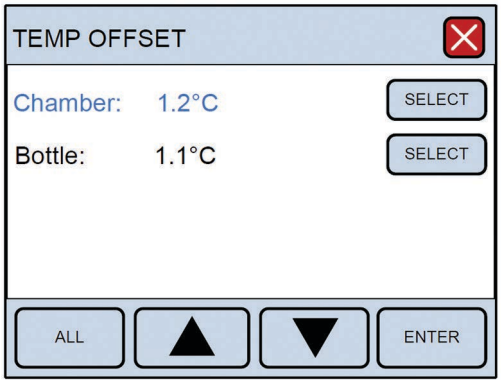
The line to be modified will turn blue, indicating that the Wire Interface is waiting for input. When ALL is chosen, all lines corresponding to all four channels will turn blue.

Changing the numeric value for the chosen parameter can be done by pressing UP or DOWN arrows.



Once the desired setting has been chosen, pressing ENTER will lock the selection and be stored in memory.

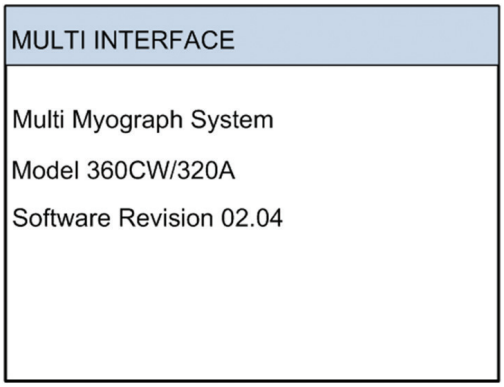
Pressing the white X in the red box will exit the menu and take you automatically to the **Main Menu.**



3.2 Power-up screen

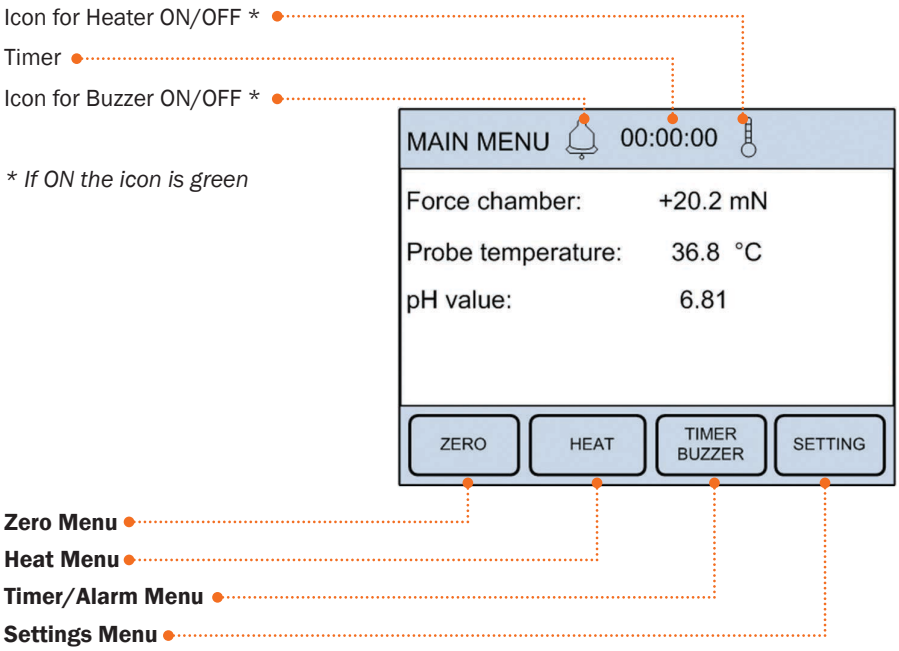
After turning on the Wire Interface, an introduction screen appears. It displays the product system, model no., software version number, date and the system ID number.

The system is auto-initializing while this screen is displayed.



3.3 Main Menu

The **Main Menu** gives a good overall status on how the Wire Interface is working. It displays the force, pH, probe temperature, timer and the active status (buzzer, timer, heat).



Buzzer icon:
This icon indicates the status on the Buzzer.
If the icon is grey the Buzzer is OFF.
If the icon is green the Buzzer is ON (active) and will make a sound when the timer reaches zero.

Timer:
The Timer is a countdown timer that can be set to maximum 24 hours. If the Buzzer is activated it will buzz when the timer reach zero.

00:00:00

Heat icon:
This icon indicates the status of the chamber heat.
If the icon is grey the Heat is OFF.
If the icon is green the Heat is ON (active).

Four sub-menus are accessible from the **Main Menu** screen:
Zero Menu
Heat Menu
Timer/Alarm Menu
Setting Menu

3.4 Zero Menu

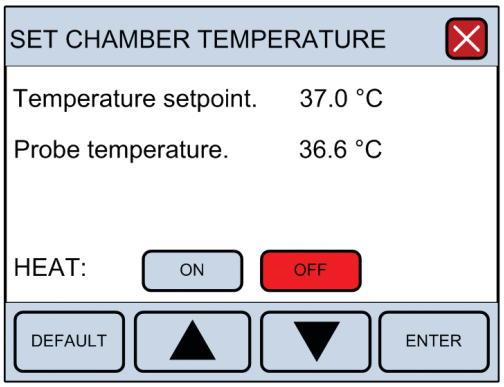
Is used to zero the output from the force transducer. Pressing ZERO will reset the baseline of the chart traces without affecting the calibrations.

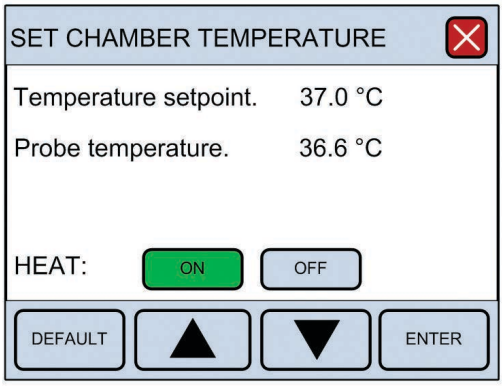
3.5 Heat Menu

The heating temperatures are controlled from this menu. To turn the heat on, or to change the temperature for the system, press HEAT in the **Main Menu**. The **Heat Menu** will be displayed allowing the user to change the system temperature, as well as turn the heat on or off. Pressing DEFAULT will automatically reset the temperature setpoint to 37 °C. Manually change the temperature by pressing UP or DOWN arrows. Pressing ENTER will save the new temperature setpoint.

ON

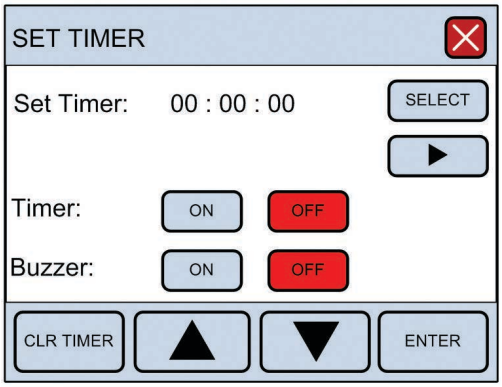
To turn the heat on press ON and it will turn green. The system will heat to the desired temperature setpoint. In the **Main Menu** the heat icon turns green when the heat is on.





3.6 Timer and Buzzer Menu

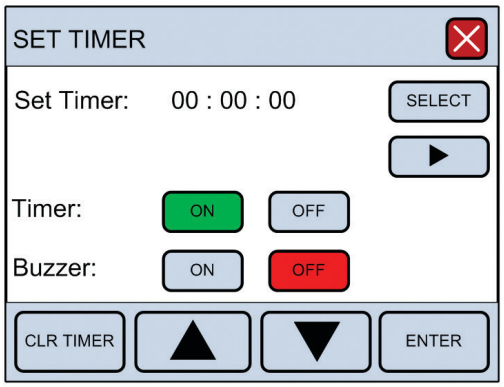
The timer and buzzer are controlled from this menu. Use SELECT to program the timer. The timer can be programmed in the interval from 0 to 23:59:59 (Hours : minutes : seconds). When **Set Timer** is selected use the UP and DOWN arrows to program the timer. Use the RIGHT arrow to move from hours, minutes and seconds. Press ENTER to save the programmed time.



To start the timer press ON and it will turn green.

When the timer reaches zero it automatically switches to OFF.

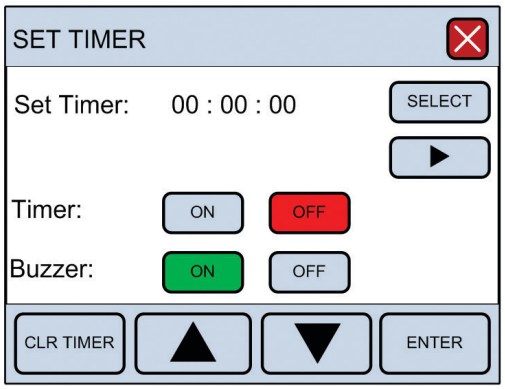
If the buzzer is turned on it will make a tone when the timer reaches zero.



To activate the buzzer press ON and it will turn green.

In **Main Menu** the bell icon also turns green.

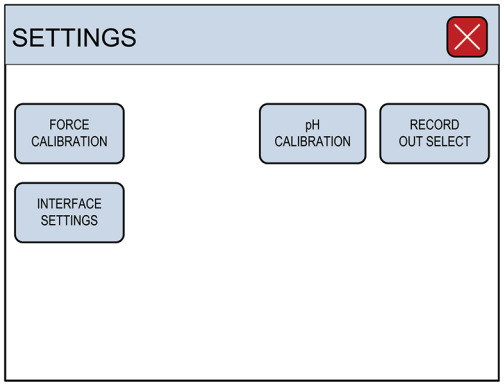
ON



3.7 Settings Menu

The **Setting Menu** contains several sub-menus. These sub-menus include:

Force calibration
pH calibration
Record out select
Interface settings



3.7.1 Force Calibration Menu

Prior to shipping the Wire Myograph System has gone through two days of continuous testing, including final force calibrations. However, DMT recommends that new force calibrations are performed before starting to use the Wire Myograph System for the first time.

Begin the calibration procedure by pressing **Force Calibration** in the **Settings Menu**. The calibration procedure is listed in 6 individual steps and needs to be performed to calibrate the system. Before starting the Force calibration the following is performed.

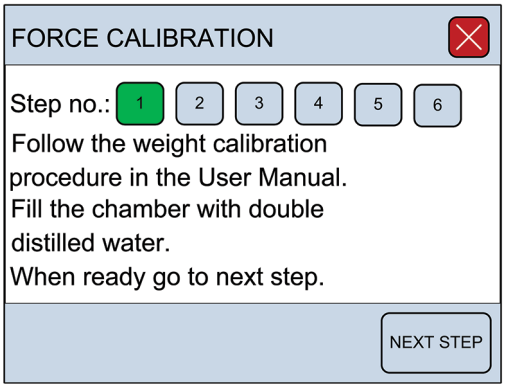
- Place the calibration bridge and T-balance on the Wire Myograph (see figure 3.1 for 360CW or 3.2 for 320A) allowing it to be warmed up together with the Wire Myograph. Turn on the heating in the **Heat sub-menu** to the appropriate temperature used during your experiments
- Mount a 40 µm stainless steel wire on the jaws connected to the force transducers.

NOTE
THE WEIGHT SHOULD NOT BE PLACED ON THE T-BALANCE YET.

Step 1 - Involves setting up the chamber for calibration. Fill the chamber to a normal level with double distilled water. Move the jaws apart.

Press NEXT STEP.

IMPORTANT
TURN ON THE HEAT AND SET THE TEMPERATURE AT THE LEVEL AT WHICH THE EXPERIMENTS WILL BE PERFORMED.


FORCE CALIBRATION
Step no.: 1 2 3 4 5 6
Follow the weight calibration procedure in the User Manual.
Fill the chamber with double distilled water.
When ready go to next step.
NEXT STEP

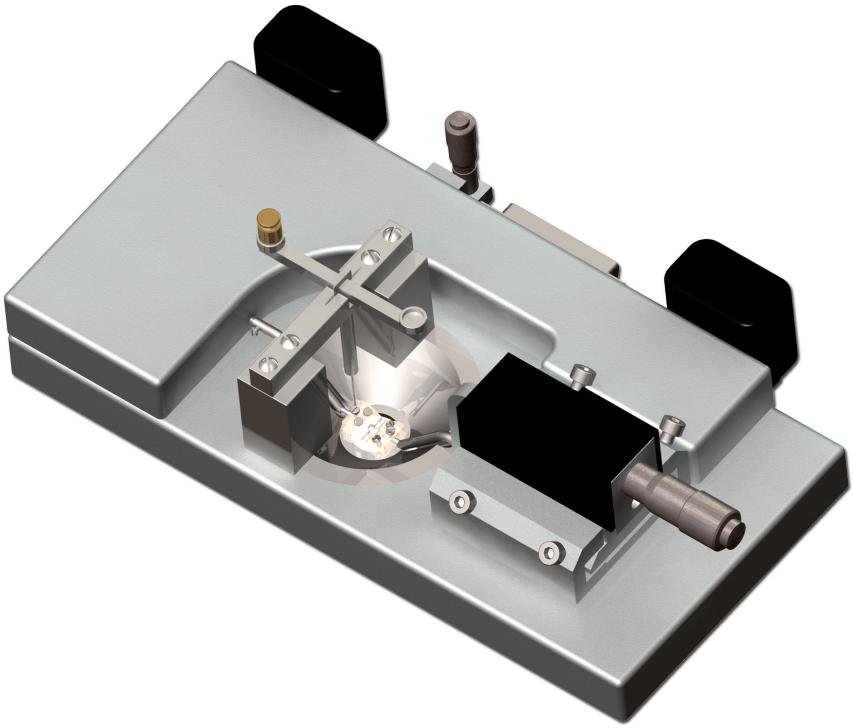


Figure 3.1 *Force calibration set-up - showing placement of the calibration bridge and T-balance (with weight in place) for Wire Myograph - 360CW*

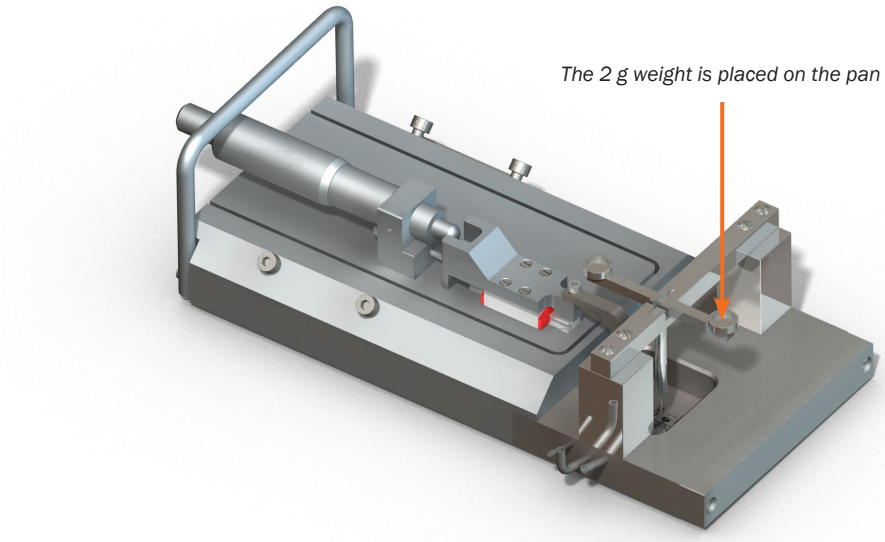
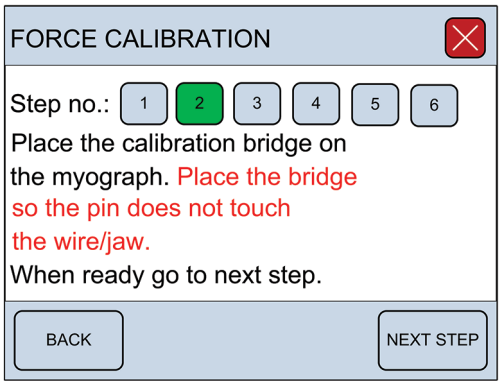


Figure 3.2 *Force calibration set-up - showing placement of the calibration bridge and T-balance for Wire Myograph - 320A*

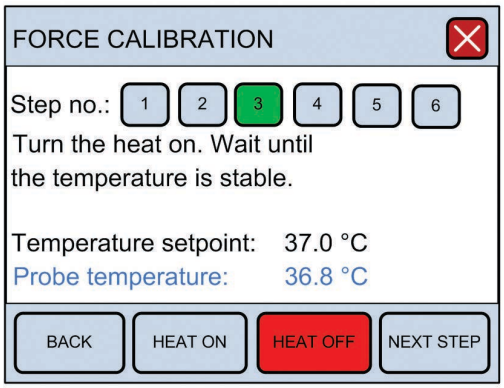
Step 2 - Involves setting up the Calibration Kit for the actual force calibration. Make sure that the T-balance pin is placed between the wire and the jaw as illustrated in figure 3.3. Carefully move the calibration bridge until the tip of the T-balance pin is placed freely between the wire and the jaw, which means it does not touch the wire or the jaw, see figure 3.3.

Press NEXT STEP when the calibration kit has been properly placed.


FORCE CALIBRATION
Step no.: 1 2 3 4 5 6
Place the calibration bridge on
the myograph. Place the bridge
so the pin does not touch
the wire/jaw.
When ready go to next step.
BACK
NEXT STEP

Step 3 - Initiates the heating process for the chambers if not already done. In order for the calibration to be accurate, the transducers must be heated to the experimental temperature to be used. This accommodates heat-induced expansion of the electronic parts in the transducer. Otherwise, inaccurate readings and transducer drift may occur, producing errors into the experiment.

Covering the chamber with the chamber cover will expedite the heating. Place the temperature probe into the chamber for the first calibration to determine when the chamber has reached the target temperature. Heating will take about 20 to 30 minutes for the chamber and transducer to reach 37 °C with the chamber cover in place. Once the chamber are heated and have reached the target temperature, press NEXT STEP.



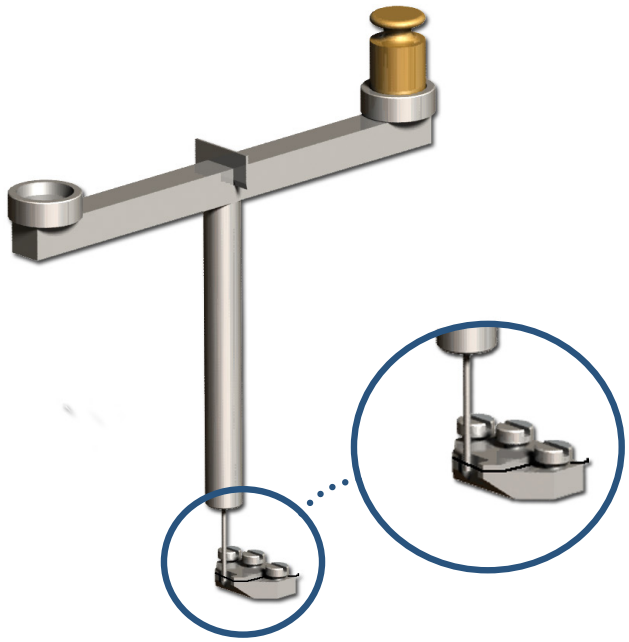
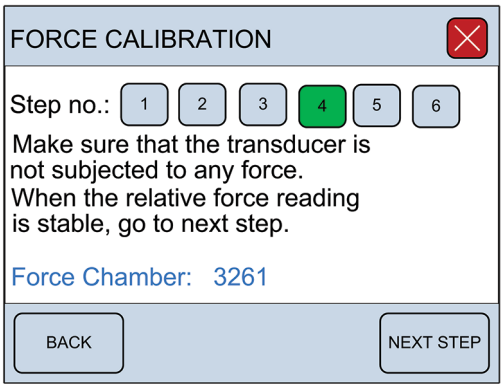


Figure 3.3 *Illustration of how to fit the T-balance pin between the wire and the gap in the jaw support*

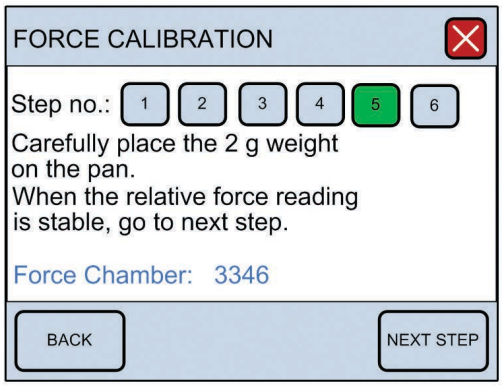
Step 4 - is the first step in the actual force calibration process. A four digit number will be displayed in blue at the bottom of the screen. If nothing has been disturbed during the heating process, the zero, 0 gram, or 0.0 mN calibration should be stable as indicated by the four digit number. Wait at least 30 to 45 seconds until the four digit number is stable before pressing NEXT STEP.


FORCE CALIBRATION
Step no.: 1 2 3 4 5 6
Make sure that the transducer is not subjected to any force.
When the relative force reading is stable, go to next step.
Force Chamber: 3261
BACK
NEXT STEP

NOTE:
NORMAL OPERATING VALUES FOR THE FORCE TRANSDUCER DURING CALIBRATION SHOULD BE BETWEEN 3000 AND 3500. IF THE VALUE IS 0, A SINGLE DIGIT, OR A THREE DIGIT NUMBER, THE FORCE TRANSDUCER IS BROKEN AND NEEDS TO BE REPLACED. IF THE VALUE IS LESS THAN 2000 OR GREATER THAN 4500 BUT STILL A FOUR DIGIT NUMBER, THE FORCE TRANSDUCER IS BROKEN BUT SHOULD BE ABLE TO BE REPAIRED BY A TEMPERATURE COMPENSATION DONE BY DMT. IF THE MESSAGE OFF IS DISPLAYED ON THE MAIN PAGE OF THE INTER- FACE, EVEN THOUGH THE CHAMBER IS PLUGGED IN AT THE REAR OF THE WIRE INTERFACE, THE FORCE TRANSDUCER IS BROKEN AND NEEDS TO BE REPLACED. IN ADDITION, IF THE FORCE READING(S) APPEAR YELLOW, CANNOT BE RESET TO ZERO, AND THE TRANSDUCER CANNOT BE RECALIBRATED, THE FORCE TRANSDUCER IS BROKEN AND NEEDS TO BE REPLACED.

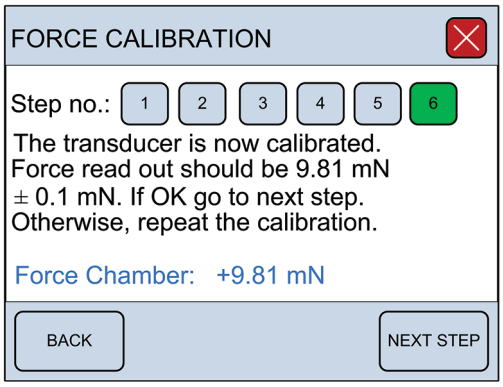
Step 5 - At this step, place the 2 gram weight at the pan on the calibration T-balance closest to the transducer (over the transducer) see figure 3.1 or 3.2, to simulate the stretch created by the contraction of a mounted ring preparation.

Remember, a 2 gram weight in a 90° vector is divided, and the transducer will only detect 1 gram or 9.81 mN of force. The weight placement should cause a positive increase in the four digit number. Wait at least 30 to 45 seconds for the applied force to stabilize before pressing NEXT STEP.


FORCE CALIBRATION
Step no.: 1 2 3 4 5 6
Carefully place the 2 g weight on the pan.
When the relative force reading is stable, go to next step.
Force Chamber: 3346
BACK
NEXT STEP

Step 6 - is to verify that the calibration was performed correctly. The Force Chamber reading should be 9.81 ± 0.1 mN. If the Force Chamber reading is off by more than 0.1 mN, then remove the weight, press BACK to return to Step 4, and repeat the calibration process. If the Force Chamber reading is satisfactory, then press NEXT STEP to end the calibration.

After calibrating the force transducer, carefully remove weight, T-balance and calibration bridge. The Wire Myograph System is now ready for force measurements.


FORCE CALIBRATION
Step no.: 1 2 3 4 5 6
The transducer is now calibrated.
Force read out should be 9.81 mN ± 0.1 mN. If OK go to next step.
Otherwise, repeat the calibration.
Force Chamber: +9.81 mN
BACK
NEXT STEP

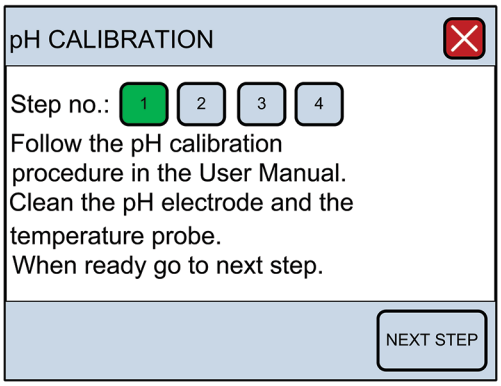
3.7.2 pH Calibration Procedure

Before the pH calibration is performed, be sure to select the way the pH electrode is intended to be used. See **pH Set-up Menu** (under **Interface Settings**) in chapter 3.7.4.2.

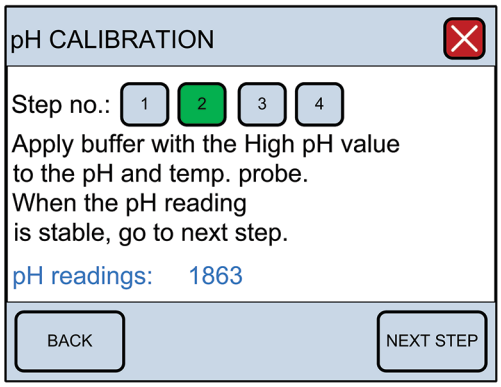
The temperature is an important parameter in the calibration formula and is obtained automatically if the **Temperature compensation** has AUTO selected. If MANUAL is chosen, the **Manual temperature** is used in the pH calibration formula, and the temperature probe is not used. In the MANUAL mode, the temperature of the calibration buffers is measured with a thermometer and entered manually in the **Manual temperature** line.

The calibration procedure is listed in 4 individual steps and needs to be performed one by one to calibrate the pH

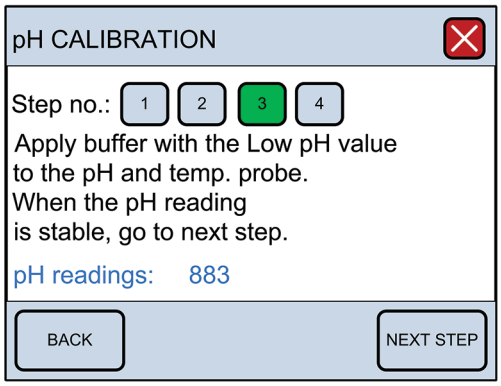
Step 1 - Involves cleaning the pH electrode and the temperature probe with double-distilled water. When ready press NEXT STEP.


pH CALIBRATION
Step no.: 1 2 3 4
Follow the pH calibration
procedure in the User Manual.
Clean the pH electrode and the
temperature probe.
When ready go to next step.
NEXT STEP

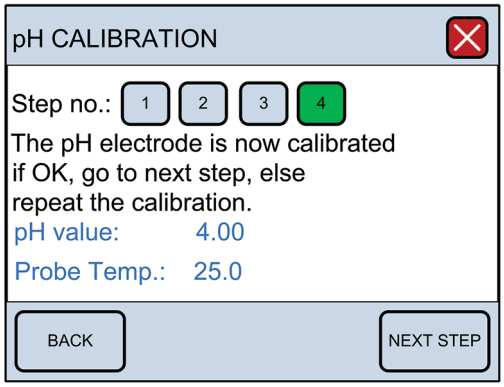
Step 2 - Place the pH electrode and temperature probe in the high buffer solution (here pH 7) and turn on stirring. When the relative pH output in the blue line is stable, press NEXT STEP.


pH CALIBRATION
Step no.: 1 2 3 4
Apply buffer with the High pH value
to the pH and temp. probe.
When the pH reading
is stable, go to next step.
pH readings: 1863
BACK
NEXT STEP

Step 3 - Place the pH electrode and temperature probe in the low buffer solution (here pH 4) and turn on stirring. When the relative pH output in the blue line is stable, press NEXT STEP.


pH CALIBRATION
Step no.: 1 2 3 4
Apply buffer with the Low pH value
to the pH and temp. probe.
When the pH reading
is stable, go to next step.
pH readings: 883
BACK
NEXT STEP

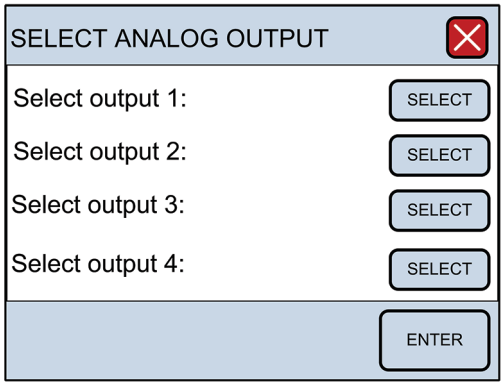
Step 4 - The calibration is now finished. The readings in the two bottom lines are the actual pH and temperature readings.



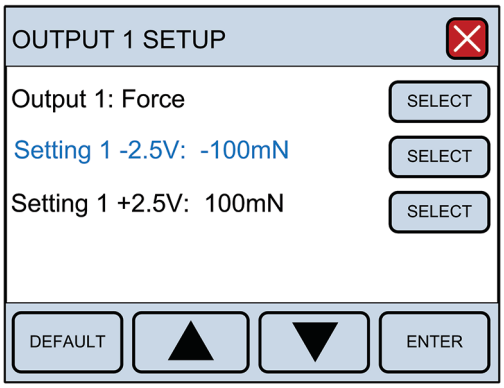
3.7.3 Select Analog Output (optional)

The **Analog Output Menu** determines what will be sent to the BNC analogue output (REC 1, REC 2 REC 3, REC 4 at the back of the Wire Interface). There are 4 analog outputs, and each output is individually programmable. Any change made to the analog output will affect the data sent from the Wire Interface to a data acquisition system such as AD Instruments PowerLab. Therefore remember to check the data acquisition system's set-up when a change is made. The analog output is working in range of -2,5V to +2,5V.

Use SELECT to select the out channel number to be changed. Press ENTER to go to the output set-up.



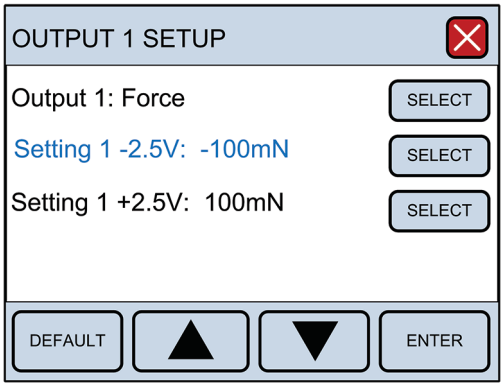
Use SELECT to select the line to be changed. Use the UP and DOWN arrow or DEFAULT to change/select a new set-up.



The following parameters in the Wire Interface can be selected as output to the analog channels. Force Near, Force Far, Temperature Probe, Chamber Temperature, pH1, (Optional: Digital Output 1, Digital Output 2, Digital Input 1, Digital Input 2).

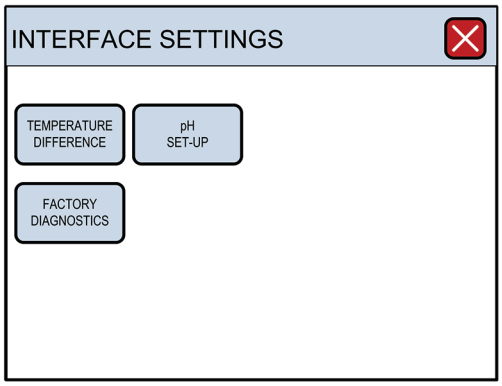
When the chosen parameter is selected press ENTER to save the value in the memory.

The output range is -2,5V to +2,5V. The user can select the parameter value that gives -2,5V and the value that gives +2,5V. In this example -100mN is -2,5V and +100mN is +2,5V. Selecting asymmetrical values is also valid. They can be -2,5V = 0mN and +2,5V = 100mN.



NOTE
REMEMBER TO PRESS ENTER TO SAVE THE LINE CHANGES IN MEMORY.

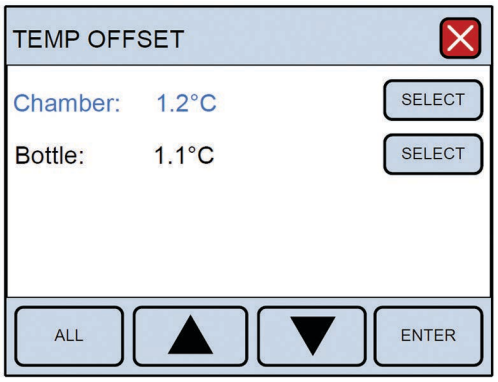
3.7.4 Interface Settings



The **Interface Settings sub-menu** has an additional three sub-menus:

Temperature Difference
pH Set-up
Factory Diagnostics

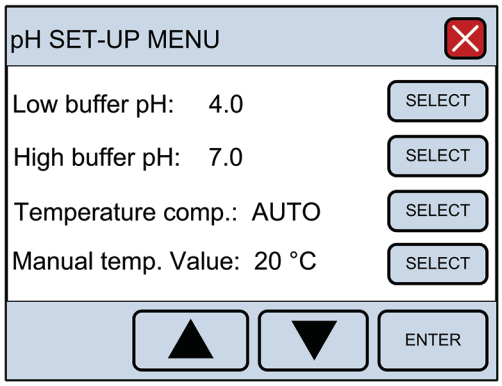
3.7.4.1 Temperature Difference (offset)



The temperature difference function allows the user to fine tune the temperature set point of the system. Although the temperature set point for the system can be set in the **Heat Menu** there may be a small discrepancy between the actual temperature of the system and the defined set point.

The user can adjust the temperature of each chamber individually to fine-tune the temperature setting, so the exact temperatures are achieved in each chamber. This is referred to as a temperature offset (TEMP OFFSET ON CHAMBER). The SELECT and ALL functions are the same in this menu as for previously described menus. Pressing ENTER will store the numbers in memory for future experiments

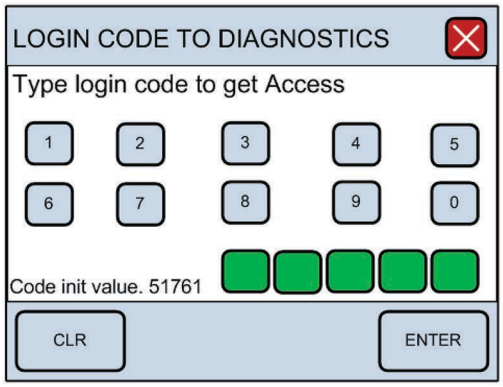
3.7.4.2 pH Set-up Menu



The pH calibration is a 2-point calibration. In the pH set-up menu the two pH values used for the 2-point pH calibration should be selected. The default in the pH Calibration setup is the pH values 4 and 7. If using pH buffer with different pH values than 4 and 7 for the pH calibration enter the appropriate pH.

The temperature is an important parameter in the calibration formula and is obtained automatically if the temperature compensation it is set to AUTO as shown.
If MANUAL is chosen, a manually set temperature is used in the pH calibration formula, and the temperature probe is not used. In the MANUAL mode, the temperature of the calibration buffer is measured with a thermometer and entered manually in the **Manual temp. Value** line.

3.7.4.3 Factory Diagnostics



Entering **Factory Diagnostics** will display the **Login code to diagnostics** window. This window is only for trained technicians and used for diagnostics and troubleshooting purposes. The general user will not have access to this window. Entering the proper five digit login code however will allow the trained technician access to diagnostics panels that will provide information during a malfunction, or mechanisms to change other settings controlled by the onboard computer.

APPENDIX 1 - SYSTEM SPECIFICATIONS

Technical specifications - Wire Interface

Voltage:	External 100-240VAC to 24VDC ADAPTER +/-10%
Current max.:	3.3Amps at 24VDC.
Dimensions:	34 x 25 x 15 cm (LxDxH)
Net weight:	5kg.
Environmental humidity:	20% to 80% RH, none condensing.
Environmental operating temperature:	15 to 40°C.
Environmental storage temperature:	4 to 70°C.

Technical specifications - Confocal Wire Myograph - 360CW

Vessel size:	>60 µm
Vessel alignment:	Manually X, Y & Z settings
Chamber:	Single bath/conical shape
Chamber material:	Acid-resistant stainless steel
Chamber volume:	Max. 10 ml
Chamber suction:	No
Chamber cover:	With connections for suction and gassing
Chamber gassing:	Yes
Force range:	-100 to +200mN
Force resolution:	0.1mN
Micrometer:	Manually operated precision micrometer
Force calibration:	Manual
Heating:	Built into chamber, independent of superfusion
Temp. range:	Ambient temp. - 50°C
Temp. resolution:	0.1°C
Temp. probe:	External
Output reading:	Force (mN)
Analogue output:	Up to four outputs, 1.0V full scale for all acquired signals, user defined
Serial output:	Serial interface - RS232/RS485
Voltage:	100 to 240 VAC (auto) 50/60Hz
Ambient temp.:	15 to 30°C

Technical specifications - Single Wire Myograph - 320A

Vessel size:	>60 µm
Chamber:	Single bath
Chamber material:	Acid-resistant stainless steel
Chamber volume:	Max. 10 ml
Chamber suction:	No
Chamber cover:	Yes
Chamber gassing:	Yes
Force range:	-100 to +200 mN
Force resolution:	0.1 mN
Micrometer:	Manually operated precision micrometer
Force calibration:	Manual
Heating:	Built into chamber, independent of superfusion
Temp. range:	Ambient temp. - 50°C
Temp. resolution:	0.1°C
Temp. probe:	External
Output reading:	Force (mN)
Analogue output:	Up to four outputs, 1.0 V full scale for all acquired signals, user defined
Serial output:	Serial interface - RS232/RS485
Voltage:	100 to 240 VAC (auto) 50/60 Hz via external power supply
Ambient temp.:	15 to 30°C

Optional accessories

Enable pH-meter on the Wire Interface	
- range:	pH 0 - 14
- temp. correction:	0 - 50 °C
Electronic valve:	100 to 240 VAC (auto) 50/60 Hz via external power supply

NOTES

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